

## Scientific publishing: Rising cost of monopolies

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A recent editorial in *Current Science*<sup>1</sup> discusses the issues of access to research journals. This article examines the issue of cost rise and discusses a study undertaken at the Indian Institute of Science (IISc), Bangalore.

The average cost<sup>2</sup> of Institute of Scientific Information (ISI – Web of Science)-indexed journals in 2008 is US\$ 1238. However, the average costs of a journal in chemistry, physics, engineering and biology are US\$ 3490, 3103, 1919 and 1810 respectively, with an average increase of 5–9% in cost per year. The consumer price index (CPI) for the US city average for all items is a widely used measurement for the general rate of inflation in USA. The Association of Research Libraries<sup>3</sup> in USA mentions that the CPI has increased by 73% between 1986 and 2004, but the research library expenditure for journals has increased by 273% during the same period. Another study<sup>4</sup> has quantified this effect by representing the buying power of the journal acquisition dollar as a per cent of the CPI dollar value. In other words, a library that has realized increases equal to the rate of inflation from 1967, would be able to purchase only 20% of the journals it could have in 1967. Further, the number of journals published now is dramatically higher than in 1967, increasing the pressures on the budget. These rapidly rising journal prices have thus battered the ability of researchers, libraries and institutions to access scientific publications.

Global research article output is estimated to be around two million articles per annum<sup>5</sup> in around 18,000 journals (of which 8000 are indexed in ISI). In the US\$ 15 billion market for scientific, technical and medical (STM) journal publishers, the top five are commercial publishers who account for nearly 50% of the revenue<sup>6</sup>, while the rest of 10,000 publishers account for less than 50% (Figure 1). The top publisher (Elsevier) has more than a quarter of the market, while the newly formed combination of Springer and Kluwer Academic Publishers accounts for nearly 15% of the market share. The four major academic societies, namely the American Chemical Society (ACS), American Institute of Physics (AIP), American Physical Society

(APS) and Institute of Electrical and Electronics Engineers (IEEE), publish nearly 200 journals overall and have a market share of 3.6, 2.8, 1.7 and 1.9% respectively.

With a budget of Rs 100 million (US\$ 2.5 million) for journal subscriptions, IISc houses the best library for science and engineering in India. IISc subscribes to nearly 1250 journals from around 200 publishers. An analysis was conducted to determine the journals in which IISc faculty publish. In the five-year period of 2002–06, researchers at IISc published roughly 5000 papers in ISI-indexed journals. Among these, nearly 80% appeared in 250 journals. Considering that 250 journals is 20% of the number of journals that IISc subscribes to, it is interesting that the Pareto's principle and Bradford's law (Box 1) hold. A further scrutiny revealed that nearly 50% of the papers appeared in 125 journals (10% of the library subscription). To examine whether these trends are observed in journal pricing, a list of publishers and the amount paid to them was drawn. This was even more shocking. Nearly 50% of Rs 100 million was paid to a single publisher, while the top ten publishers accounted for 85% of the library budget, and the top 50 publishers accounting for 98.7% of the same.

Another analysis was carried out to determine the total number of journals in which researchers at IISc publish or cite in their work. This number is around 600, indicating that researchers have no 'interaction' with nearly 650 journals subscribed by IISc! Therefore, it was suggested we

examine whether to stop subscriptions to these journals and subscribe to new journals from the amount saved. However, this met with two major obstacles.

The first obstacle was that the publishers had 'bundled' packages known in the librarian terminology as the 'big deal'. This included multiyear subscriptions, cancellation limitation clauses, annual cost increase, incremental cost addition for on-line content and, more importantly, a combination of a highly cited popular journal with several small journals. These additional titles are often journals that the library would not otherwise purchase. However, these schemes are attractive because they reduce the serial unit cost. Increasingly, libraries are making multiple payments for content in different forms and paying for subscriptions that are linked together. Because many journal subscription costs are incremental add-ons to the existing subscriptions for a second format, the unit cost is substantially reduced. When a library starts paying US\$ 10 as an add-on for electronic access to a subscription that formerly cost US\$ 100, the unit cost for the 'two' subscriptions becomes US\$ 55. Without adding new content to the collection, a unit subscription cost based on the 'two' titles has been reduced by 45%. Similarly, when a popular scientific journal is linked with ten less popular journals, the journal unit cost of the 'package' is significantly reduced. These deals bundle the strongest journals with the weakest publisher journals and it is a combination of the essential with the non-essential to

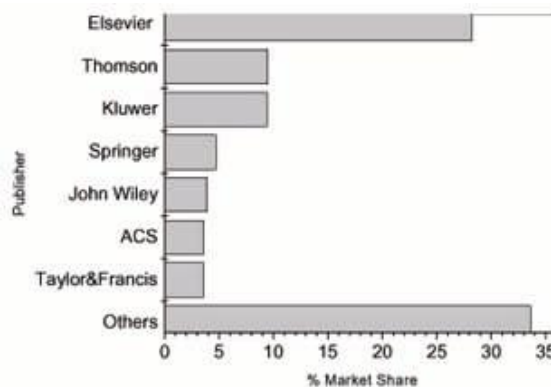


Figure 1. Market share of major STM journal publishers.

**Box 1. Pareto's principle and Bradford's law**

Pareto's principle (also known as the 80–20 rule) states that, for many events, 80% of the effects come from 20% of the causes. Pareto was the first to observe that 80% of income in Italy went to 20% of the population and found it to be valid for the economic distribution in various other countries. Bradford's theory<sup>13</sup> states that if scientific journals are arranged in the order of decreasing productivity of articles on a given subject, they can be divided into a 'nucleus' of journals devoted to the subject, with radiating zones of journals contributing fewer and fewer articles. Trueswell<sup>14</sup> first tested this law on library circulation data and found that approximately 80% of the total number of circulation transactions was accounted by only 20% of the collection. Subsequently, many empirical studies have verified this 80/20 rule<sup>15</sup>. Eugene Garfield used Bradford's law as a justification for the selectivity of journals included in the *Science Citation Index*<sup>16</sup> and simply stated, 'a surprisingly small number of journals generate the majority of both what is cited and what is published'<sup>17</sup>. For more details on Bradford's law, the readers are referred to two excellent articles<sup>18,19</sup>.

weaken a collection, which the library neither needs nor wants<sup>7</sup>. This is sometimes referred to as 'selling of our collecting souls'<sup>8</sup>. Greater awareness has resulted in the faculty and students moving away from the 'big deal' and supporting title-by-title cancellations. Several universities in USA have already resolved to move away from 'bundled packages'<sup>9–12</sup>.

The second major obstacle for removal of journals was from the researchers themselves. For example, it was suggested to a small department in IISc that three journals costing two million rupees be removed from the subscription. Though no one from the department had published in these journals or even cited work from these journals in the past ten years, there was a strong plea to retain these journals. This is primarily because cancellation of the subscription to these journals does not bring any apparent direct benefit to the department. Some scheme wherein this money saved could be given back to the department as a consumable budget may have changed the department's need to retain these journals!

Researchers expect that the administration will subscribe to all journals that are possible; librarians like to give access to all journals for the researchers, while the publishers would like to maximize their profit. The efforts to contain

bloating library budget ultimately seem to rest on the administrator of the university, who is unable to alter the dynamics because of resistance from every quarter. There is a need for libraries of the Indian institutions to collectively negotiate with the publishers. Though the Indian National Digital Library in Engineering Science & Technology Consortium (a programme of the Ministry of Human Resources Development, India, of which all major institutes, including IISc are members) exists, there has been no analysis of what the researchers in these institutions actually need and all previous negotiations have supported the 'big deal'. With licensing clauses that forbid cancelling of current subscriptions, these libraries are forced to pay for access to journals of limited or no use.

With some of these top publishers merging and increasingly becoming monopolistic, the pricing policies are likely to become more intransigent. Unless there is a concerted effort by researchers to understand the need to trim library budgets and by the library to aggressively negotiate with the publishers, the problem is bound to aggravate in the coming decades. Either the current system should address these concerns over price and access, or a new system will have to take its place.

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